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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/627,725

07/28/2003

Ho-Jin Kweon

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49455

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04/30/2009

STEIN MCEWEN, LLP  
1400 EYE STREET, NW  
SUITE 300  
WASHINGTON, DC 20005

EXAMINER

CREPEAU, JONATHAN

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/627,725	<b>Applicant(s)</b> KWEON ET AL.	
	<b>Examiner</b> Jonathan Crepeau	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 11-14, 17-20, 22-24, 38, 39 and 41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-14, 17-20, 22-24, 38, 39 and 41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/11/09 3/27/09</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office action addresses claims 11-14, 17-20, 22-24, 38, 39, and 41 after entry of the amendment filed on April 9, 2009. Upon reconsideration, the allowability of claims 11-14, 17-20, 22-24, 38, 39, and 41 has been withdrawn and new grounds of rejection have been made herein. As such, prosecution is reopened and this action is non-final.

### ***Claim Rejections - 35 USC § 103***

2. Claims 11-14, 17-20, 24, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kweon et al (U.S. Patent 6,183,911) in view of Gao et al (U.S. Pre-Grant Publication No. 2002/0127175) in view of JP 11-097027.

Kweon et al. is directed to a positive active material for a rechargeable lithium battery. The active material may comprise  $\text{LiCoO}_2$ ,  $\text{LiNiO}_2$ , or  $\text{Li}_x\text{Ni}_y\text{Co}_{1-y}\text{O}_2$  and has a surface treatment layer comprising  $\text{V}_2\text{O}_5$  on the lithiated core (see abstract). The active material is made by a process of dissolving vanadium pentoxide in an organic solution, coating the active material, and drying the coated compound at 100-1000 degrees C for 1-20 hours (see col. 2, line 35-65), the latter anticipating the limitations of drying at 60-100 C and “without further heat treatment.” Regarding claim 14, the solvent mixture can be refluxed (see col. 2, line 43). Regarding claims 19 and 20, the coating material source (vanadium pentoxide) is present in the solution in an amount of 0.1-30 wt%.

Kweon et al. do not expressly teach that the lithiated compound is prepared by mixing a lithium source, a metal source, and a solvent and heat treating the mixture twice, as recited in claims 11 and 39.

Gao et al. is directed to methods of making lithium cobalt oxides. In [0034], the reference teaches that source compounds can be suspended in a solution of other source compounds and the mixture is spray dried. Subsequently, the material is subjected to two heating steps to form the final cathode material (see [0035], [0036]).

Therefore, it is submitted that the artisan would be motivated to make the lithiated compound of Kweon et al. according to the process of Gao et al. In [0036], Gao et al. teach that the second heat treatment step forms and enhances the hexagonal layered crystal structure of the compounds. Further, the technique of mixing source compounds with a solvent and heat-treating twice was recognized as part of the ordinary capabilities of one skilled in the art.

Kweon et al. further do not expressly teach that the coating material is a hydroxide, oxyhydroxide, oxycarbonate, or hydroxycarbonate, as recited in claims 11 and 39.

JP 11-097027 teaches a nonaqueous secondary battery having a positive electrode with a sheathing layer thereon (see abstract). Among other materials, the layer may comprise a hydroxide of an alkali metal (see [0011] of the machine translation).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the alkali hydroxide disclosed by JP '027 as the coating material of Kweon et al. In the abstract, JP '027 teaches that the object of the invention is to provide a battery "excellent in cyclic

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characteristics by providing a positive electrode which is high in capacity, and is prevented from being lowered in cell capacity and the like even after charging/discharging have been cycled."

Accordingly, the artisan would be motivated to use the alkali hydroxide disclosed by JP '027 as the coating material of Kweon et al. in hopes of obtaining these advantages.

Regarding claim 24, the sieving of the dried compound would be an obvious step in preparing the compound for use in a battery electrode.

3. Claims 22, 23, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kweon et al. in view of Gao et al. in view of JP 11-097027 as applied to claims 11-14, 17-20, 24, and 39 above, and further in view of Maegawa et al (U.S. Patent 6,383,235).

However, Kweon et al. further does not expressly teach that the lithiated compound and the solution are "injected" into a mixer as recited in the claim 38.

Maegawa et al is directed to a method of forming a cathode material by spray-drying. In the method, two solutions are mixed and then sprayed (injected) into a spray-dryer with a compressed air flow (see Example 1).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the spray-dryer of Maegawa et al. to perform the mixing and drying of the material of Kweon et al./JP '027. Regarding the mixing of the materials, it would be obvious to employ any method

that would result in sufficient mixing of the lithiated compound and the coating solution.

Maegawa et al. is evidence of this, and discloses in numerous locations that its process and apparatus provides for good mixing between the solutions. Therefore, a skilled artisan would be motivated to use a spray dryer as suggested by Maegawa et al. to mix the materials of Kweon et al./ JP '027. Regarding claim 38, the drying step in the spray dryer of Maegawa et al. can be characterized as “continuously increasing the temperature within the mixer.” Furthermore, the use of a compressed air stream to introduce the solution as disclosed in Maegawa would render obvious the subject matter of claim 22.

Regarding the limitation that the coating step is performed under vacuum as recited in claim 23, this step would also be well within the skill of the art to perform in the method of Kweon et al. as modified by Gao, JP '027 and Maegawa. By performing an evacuating step in the spray-dryer, the net air flow through the spray-dryer would be increased and drying time would be reduced. Accordingly, this modification would be obvious to a skilled artisan.

4. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kweon et al. in view of Gao et al. in view of JP 11-097027 as applied to claims 11-14, 17-20, 24, and 39 above, and further in view of Shindo et al (U.S. Patent 6,045,947).

Kweon et al. does not expressly teach that the average particle diameter of the lithiated compound is 10 microns, as recited in claim 41.

Shindo et al. is directed to an electrode plate for a secondary battery. In Example 1 the reference discloses that an  $\text{LiCoO}_2$  material having an average particle diameter of 10 microns is used as the active material.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. In this case, the use of an  $\text{LiCoO}_2$  material having an average particle diameter of 10 microns as suggested by Shindo et al. in the electrode of Kweon et al. would have yielded predictable results and would have therefore been obvious.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (571) 272-1292. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1795  
April 30, 2009